CATEGORICAL EXCLUSION WORKSHEET:
RESOURCE CONSIDERATIONS

Soils Report

Crane Point Vegetation Restoration

Palouse Ranger District

Nez Perce/Clearwater National Forest

Description of the Proposed Action

Proposed vegetation treatments include:

- 701 acres of commercial timber harvest (622 acres of regeneration and 79 acres of commercial thinning)
- 20 acres of Old Growth enhancement.
- 241 acres of non-commercial fuels treatment.

The following would be conducted in support of the above:

- Approximately four (4) miles of temporary roads would be constructed to facilitate vegetation treatments and would be decommissioned no later than three (3) years after the project is completed (see Figure 4).
- Road maintenance, reconstruction or improvement.
- Replace culvert on FSR 1274.

Approximately 80% of the commercial timber harvest work would be done using skyline logging systems and 20% using ground-based systems. Timber would likely be hauled via FSRs 1274 and 1273 plus their associated spur roads.

After trees are removed for regeneration harvest, the Forest Service is required by law to reduce slash generated from harvest and to prepare sites for planting (regeneration) within three (3) years. Regeneration includes site-preparation (site-prep), reforestation of blister-rust resistant western white pine, western larch, and ponderosa pine, and animal damage control for pocket gophers, where present. Site prep could include:

- Slashing of sub-merchantable trees or brush
- Prescribed burning (broadcast burning, underburning, jackpot burning)
- Mechanical or hand piling and burning of slash
- Mastication of activity fuels, sub-merchantable trees or brush
- Biomass removal
- Non-commercial thinning of lower branches to reduce ladder fuel
- Leave tree preparation and pruning – to protect the leave trees during burning activities

Before and after planting, treatment for animal damage control by pocket gophers would occur where necessary. Pocket gopher populations increase post-harvest with a flush in vegetation such as forbs, grasses, shrubs and small trees whose roots supply a ready food source. Gophers damage young trees by stem girdling and clipping, root pruning, and root exposure caused by burrowing, all of which can result in a failed plantation.

Non-commercial fuels treatments could include:

- Slashing of sub-merchantable trees or brush,
- Non-commercial thinning,
- Prescribed burning (broadcast burning, underburning, jackpot burning),
- Mastication of activity fuels, sub-merchantable trees or brush,
- Biomass removal, and
- Leave tree pruning.

Work would be done by hand and/or mechanical equipment, depending on slope. Objectives of the fuels treatments are to reduce stand density, influence species composition, and to reduce surface and ladder fuels in order to alter and reduce potential fire behavior. Multiple entries may be required to achieve the desired fuel reduction objectives.

The project proposes to decommission up to 1.5 miles of user-created trails in T43N, R4W, Sections 24, 26, 27, and decommission the legacy roads in Units 6 and 20. These roads are no longer needed for management and are inhibiting forest productivity.

Required Design Features

The following design features are required to ensure compliance with the regulatory framework for this resource and/or to reduce the risk of adverse impacts to this resource. A description is providedas to when, where and how the design feature should be applied and/or what conditions would trigger the need to apply the design feature.

SR-1: Restrict activities when soils are wet to prevent resource damage (indicators include excessive rutting, soil displacement, and erosion). **Anticipated Effectiveness:** Saturated soils are more susceptible to compaction than drier soils (Alexander and Poff 1985; Adams and Froehlich 1981; Moehring and Rawls 1970). An early research study suggests that on saturated soils one pass with harvest equipment is machine is equal to four passes when soils are dry (Steinbrenner 1955). Limiting operating periods on saturated soils would reduce the impact of tree removal to both watershed and soil resources.
SR-2: Limit ground based skidding to slopes 35% or less. **Anticipated Effectiveness:** Changing logging method from tractor to cable system reduces soil disturbance by 8-20%, logging systems that switch from tractor to skyline reduce disturbance by 20% (Archer 2008).
SR-3: Where feasible, re-use existing skid trails and landings. Locate and design skid trails, landings and yarding corridors prior to activities to minimize the area of detrimental soil effects. Space tractor skid trails no less than 80 feet apart (edge to edge), except where converging on landings. This does not preclude the use of feller bunchers or excavators for machine piling of slash. **Anticipated Effectiveness:** Reducing off-road equipment usage is an effective way to reduce the effects of harvesting trees to soil resources. Minimizing the off-road use of equipment would reduce soil displacement, compaction, and erosion. Reusing existing skid trails, reducing the number of passes on skid trails, and limiting the area covered by skid trails would reduce erosion and compaction in areas of tree removal (Froelich et al 1985; Haupt and Kidd 1965).

SR-4: Restrict equipment used for post-harvest excavator piling to existing trails and/or previously impacted areas where possible. **Anticipated Effectiveness:** This would reduce the likelihood of new and unnecessary detrimental soil disturbance.
SR-5: Ensure suspension of one end of the log when utilizing skyline yarding systems. **Anticipated Effectiveness:** This would prevent the yarded log from furrowing the hillside which would cause topsoil displacement and channelize surface and subsurface water that would lead to erosion and gullying.
SR-6: Construct drainage controls (waterbars, drain ditches) and apply available slash in log yarding corridors (cable or skyline) upon completion of harvest activities where bare mineral soil is exposed and water flow may be confined. **Anticipated Effectiveness:** This would protect the ground surface from raindrop impact and the attendant soil particle detachment. The added surface roughness and drainage features would further reduce the likelihood of runoff and erosion.
SR-7: Scarify all skid trails and landings to a depth of 6". **Anticipated Effectiveness:** Recontouring or scarifying skid trails on unburned soils is effective for increasing infiltration capacity and reducing runoff (Foltz et al 2007) and covering rehabilitated trails with at least 50% slash cover would reduce potential surface erosion from trails by up to 90% (Wade et al 2012, Foltz et al 2009).
SR-8: All temporary roads will be scarified and recontoured (decommissioned). Reshape cut/fill slopes and crossings to natural contours. Apply available slash to the recontoured surface (slash is considered available where the equipment is able to reach it from the working area where the decommissioning is occurring). **Anticipated Effectiveness:** Obliterating temporary roads as soon as possible would reduce the potential and opportunity for sediment transport to streams. Overall amounts of sediment would be reduced.
SR-9: Allow winter logging only during frozen conditions. Frozen conditions are defined as 4 inches of frozen ground or a barrier of unpacked snow greater than two feet in depth and packed snow one foot in depth. **Anticipated Effectiveness:** Winter conditions provides protection to the forest floor and reduces detrimental impacts to soil resources.
SR-11: Retain an average of 7 to 15 tons per acre of coarse woody debris (greater than 3 inches in diameter) following completion of activities. **Anticipated Effectiveness:** Retaining coarse woody debris would be effective for ensuring long-term soil productivity (Graham et al 1994; Graham et al 1999).

Cause-Effect Relationship

Cause: Fuel reduction units, mechanized removal of trees, post-harvest fuels reduction in harvest units, and planting preparation (burning).

Effect: Soil function and properties can be detrimentally affected by activities such as timber harvest and fire. Detrimental Soil Disturbances (DSD) such as topsoil loss through surface erosion and road building,

compaction, displacement, mixing, rutting, severe burning, loss of surface organic matter, and soil mass movements can all reduce site productivity. This soil disturbance occurs to varying degrees during skid trail, road, and landing excavation, ground-based harvest, and cable yarding. Many of the areas proposed for treatment have ash cap soils. Loss of the ash layer by erosion and compaction reduces water holding capacity and high quality tree rooting material. Because soil can be considered a non-renewable resource, these detrimental effects may be considered permanent for the foreseeable future.

Underburning units in a manner that consumes only top layers of duff would have minimal impacts on soils. Areas under jackpot or other slash piles would experience more severe burns that may produce chemical or structural changes in the soil, develop hydrophobicity, and kill microorganisms because of excessive heat, compromising forest productivity. Hydrophobicity may result in soil erosion and a permanent loss of that soil.

Much research has been conducted on the extent of ground disturbance from timber removal activities. Disturbance has been shown to range from 4 to over 40 percent, depending on equipment used, method, season of operation, and silvicultural prescription (Archer 2008, Clayton 1987, Clayton 1990, Sullivan 1988, Reeves et al. 2011). Understanding how much disturbance proposed activities would cause first requires a description of existing condition. Past activities that contribute to existing conditions include past fires, past timber harvests and associated activities such as road and landing construction, and a determination of whether slopes proposed for treatment are on landslide prone terrain.

Existing conditions were determined by using both LiDar imagery and the Forest Soil Disturbance Monitoring Protocol (Page-Dumroese etal, 2009) during site-specific field assessments. Estimated soil disturbance from the proposed action were then determined.

Cumulative % DSD conditions include the estimated ameliorating effects of design criteria intended to reduce Detrimental Soil Disturbance (DSD). The proposed action would add additional soil disturbance, but all proposed units would remain well within allowable detrimental disturbance standards due low levels of existing DSD and skyline harvest methods which create little ground disturbance. See Table 1 below for a summary of soil conditions in the Crane Point project.

Table 1. Existing conditions, expected disturbance from proposed actions, and cumulative effects

Unit No.	Acres	Existing % DSD	Treatment	After Proposed Action %DSD	Cumulative % DSD
T01	40	2	Skyline	9	8
T02	23	0	Ground-based	13	13
F01	28	1	Fuels	4	4
T03	11	2	Skyline	8	7
T04	18	1	Skyline	8	7
T05	60	2	Skyline	9	8
T06	76	4	Skyline	11	10
T07	16	3	Skyline	10	9
T08	44	0	Skyline	7	6
F02	25	0	Fuels	3	3
Unit No.	**Acres**	**Existing %**	**Treatment**	**After**	**Cumulative %**

		DSD		Proposed Action %DSD	DSD
T09	2.5	0	Skyline	7	6
T10	6	0	Skyline	7	6
T11	50	2	Skyline	9	8
T12	18	1	Skyline	11	10
T13	14	0	Skyline	7	6
T13A	6.6	0	Skyline	7	6
T14	11	1	Skyline	10	9
F03	29	0	Fuels	3	3
F04	10	3	Fuels	5	5
F05	6.5	4	Fuels	7	7
T15	7.7	0	Skyline	10	10
T16	30	0	Skyline	7	6
T17	30	2	Skyline	8	7
T18	6	0	Skyline	7	6
T19	23	2	Skyline	8	7
T20	125	7	Skyline	14	13
T21	13	0	Ground-based	13	13
F06	28	0	Fuels	7	7
T22	28	1	Skyline	7	6
T23	9	2	Ground-based	13	13
F07	117	2	Fuels	8	8
T24	16	4	Skyline	11	10

Regulatory Framework

The proposed action has been reviewed and is determined to be in compliance with the management framework applicable to this resource.The laws, regulations, policies and Forest Plan direction applicable to this project and this resource are as follows:

Forest Service Manual (FSM) 2500 Watershed and Air Management Manual: Region 1 has one FSM supplement related to soil management applicable to this project--The Region 1 Soil Quality Standards, FSM Soil Supplement 2500-99-1. Except for this regional supplement, national FSM direction applies.

Region 1 FSM Soil Supplement 2500-99-1:updates and clarifies the previous soil quality supplement (FSH 2509.18-94-1, Chapter 2) based on recent research and collective experience. These Regional Soil Quality Standards require that detrimental impacts to the soil resource are less than 15 percent of an activity area and that retention of coarse woody material is appropriate for the habitat type. In areas where more than 15% detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality.

National Forest Management Act (NFMA) of 1976: This Act recognizes the "fundamental need to protect and where appropriate, improve the quality of soil, water, and air resources." NFMA directs management of soil and land productivity to avoid "substantial and permanent impairment of the productivity of the land …. And … to maintain or improve soil quality", and to "insure that timber will be harvested from National Forest System lands only where…. soil, slope, or other watershed conditions will not be irreversibly damaged".

Idaho Forest Practices Act (1974) and Idaho Forestry Best Management Practices (BMPs): The Forest Practices Act was passed in 1974 to assure the continuous growing and harvesting of forest trees and to maintain forest soil, air, water, vegetation, wildlife, and aquatic habitat. This act regulates forest practices on all land ownership in Idaho. Forest Practices on National Forest lands must adhere to the rules pertaining to water quality (IDAPA 20.02.01). Idaho Forestry BMPs are included in the Idaho Forest Practices Act.

Forest Plan Consistency

The Clearwater Forest Plan standards (page II-33) related to soils would also be met as explained in Table 2. Project design measures are used to meet Forest Plan standards and would fulfill the objectives related to soils in the project area.

Table 2. Forest Plan Standards and Compliance

Standard	Compliance Achieved By:
Manage activities on lands with ash caps such that bulk densities on at least 85 percent of the area remain at or below 0.9 gram/cubic centimeters.	Project design measures are in place to minimize soil erosion, compaction and displacement. Region 1 standards would not be exceeded.
Design resource management activities to maintain soil productivity and minimize erosion.	Design and mitigation measures to maintain or improve soil productivity and stability were developed throughout this project.
Minimum coordinating requirements on land types with high or very high mass stability or parent material erosion hazard ratings are: •The field verification of the mapped unit and predicted hazard rating. •Review road locations using a team consisting of an engineering geologist, hydrologist, soil scientist, and a silviculturist. Assess concerns and possible mitigation measures to determine if a geotechnical investigation is needed •After the "P" line has been located, stake mitigating road designs, using the original ID team members and road designer.	The Crane Point project does not have areas with high or very high mass wasting potential.

Standard	Compliance Achieved By:
Review silvicultural prescriptions and unit locations on landtype 50 (old slump) to determine whether vegetation removal may contribute to slope instability.	Landtype 50 does not occur in any of the proposed harvest units.

Extraordinary Circumstances

No extraordinary circumstances need to be considered for the soil resource.

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